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(19) (CA) APPLICATION FOR CANADIAN PATENT (12)

(54) Portable Blow Out Controller

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(71) D & B Well Cap - Canada ;

(57) 5 Claims

Notice: This application is as filed and may therefore contain an incomplete specification.



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"Blow Out Controller"

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ABSTRACT OF THE DISCLOSURE

A blow out controller is provided which is functional to effect stoppage of the high pressure gases and/or fluids flowing from a wild well. The controller includes a mechanism for simultaneously sealing and gripping the outside wall of the well pipe.

FIELD OF THE INVENTION

The present invention relates to an apparatus for controlling a wild oil or gas well wherein gases and/or fluids are discharging therefrom under high pressure. More specifically, the blow out controller of the instant application may be utilized alone or, optionally, with a conventional blow out preventor (BOP) mounted on top of the assembly.

BACKGROUND OF THE INVENTION

During the operation of any oil production well, there exists constantly the hazardous possibility of the well getting out of control. Often, existing equipment is unable to seal off the fluid flow if, for example, the pressure control equipment is damaged or blown off, or where no anchoring structures eg. flanges for pressure control equipment remain.

Additionally, this same situation may preside during the drilling of a well for the production of oil or gas.

A search of the prior art revealed the following patents of interests. In U.S. patent 2,946,386, issued to M.R. Jones, there is described a latching overshot well blow out closure device which comprises a wrap-around seal and slips assembly. Above this assembly is provided a cylindrical overshot. A blow out preventor is secured to the top of the cylindrical overshot.

J.E. Eckel, in U.S. patent 2,793,700 discloses a cylindrical overshot for controlling wild wells. The overshot is adapted to receive a blow out preventor on the top thereof.

A blow out closure device pressure head is taught by J.E. Ortloff in U.S. patent 2,897,895. The device utilizes hydraulically, or otherwise remotely, actuated slips for gripping the pipe or casing. A sealant is utilized to secure a tight seal against the pipe as well as the slips. Final closure of the well is effected by the use of a conventional BOP mounted on top of the assembly. The Ortloff device, which to Applicant's best knowledge is one of the few commercially available controllers, has been found to be largely inoperative.

Prior to the present invention, there existed, therefore, the need for an operative device functional to bring blow outs under control. For example, during the fires of the oil wells in Kuwait, following the Kuwait-Iraqi war of 1991, there existed no known technology for rapidly, relatively inexpensively and safely extinguishing said fires.

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In developing the present invention, Applicant was obliged to work through several prototypes. The most notable of the earlier versions involved a device which provided hydraulically actuated slips in conjunction with a BOP. A cone member was positioned beneath the device, which member acted as a casing guide. No sealing element was provided. Although the results proved satisfactory, it was determined, however, that deleteriously, the presence of the cone not only created lateral instability but also caused pressure differentials through the tool.

SUMMARY OF THE INVENTION

It is an objective of the present invention to provide a blow out controller which is fully operative to effect stoppage of high pressure gases and/or fluids flow both during a blow out or during the well drilling.

It is another objective to provide a blow out controller which may be positioned over a wild well from a distance and controlled remotely therefrom.

It is still a further objective to provide a blow out controller which may be utilized without the addition of a conventional BOP.

In accordance with the present invention there is provided a blow out controller functional to effect stoppage of the high pressure fluids flow from a wild well.

More specifically, the controller comprises a cylindrical body which defines an inner bore adapted to receive the pipe or casing.

A resilient, replaceable, circular sealing element, defining an inner bore is secured within a cavity formed in the body. Means are provided for compressing the sealing element into a flattened circular shape so that it is in gripping engagement around the periphery of the pipe. The sealing ring compression means would comprise, in combination, a compression ring extending across the top of said sealing element, and a plurality of a rod compression members engaging said compression ring, said compression rods being reciprocable in a vertical direction.

Hydraulically actuated clamping slips are functional to move from a pipe-gripping position to a pipe-release position.

A plurality of pivotally mounted rocker arms interconnect the clamping slips and the hydraulic cylinder assemblies.

Additionally, during its movement of travel, a section of said arms, proximal the pivotal connection to said clamping slips, are functional to engage said rod members whereby simultaneous clamping and sealing of said pipe is effected. Preferably, the controller is further provided with means for controlling pressure leakage through the rocker arm openings.

Without being bound by the same, it is believed that it is because of the simultaneous clamping and sealing actions, that the unit is so operatively successful. It will be evident, therefore, that the device will either work effectively or fail, thus avoiding the

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situation where there is only a partial hydraulic seal with subsequent blowing off of the controller.

Broadly stated the invention relates to a blow out controller adapted for placement over an upstanding pipe to thereby curb wild well blow outs which comprises, in combination, a cylindrical body defining an inner bore adapted to receive the pipe therein; a resilient sealing element positioned on the inner circumference of said body, said sealing element being adapted to contract and expand against said pipe thereby coming into sealing engagement therewith; retaining means functional to secure said sealing member within said body; clamp members functional to move into and out of gripping engagement with said pipe; and means for simultaneously actuating said clamping members and said sealing element whereby said controller clamps and seals said pipe.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a blow out controller.

Figure 2 is a side sectional view of the controller of figure 1 in the release position.

Figure 3 is a side sectional view of the controller of figure 1, in the gripping position.

Figure 4 is a planar view of the controller of figure 1.

Figure 5 is a perspective view of the controller of figure 1 having the pressure leakage control means provided thereto.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Having reference to the accompanying drawings, there is illustrated the blow out controller 1.

The controller 1 defines a cylindrical body 2 which defines an inner bore adapted to receive the pipe 4. The body 2 defines an inner recess 2a therearound.

Positioned on top of the body 2 is a spacer ring 6 which will be described hereinafter.

A spacer spool 8 is secured to the top of the spacer ring 6 by means of bolts 7 which spool 8 is adapted for the connection of a conventional blind ram BOP thereto.

Returning now to the spacer ring 6, which is more clearly illustrated in figure 4, it can be seen that the ring 6 defines six elongate slots 10 extending the width thereof. A transverse bore 12 extends on opposed sides of slots 10, which bore 12 is adapted to receive a pivot pin 14 therethrough. Pivot pin 14 is secured by means of studs 16.

Mounted substantially centrally on the pivot pin 14 is a rocker arm 20. At its outer end the rocker arm 20 defines a bore 21 adapted to receive a pivot pin 22. On to pin 22 is secured a piston rod 24 of a cylinder assembly 26. At its inner end, the rocker arm 20 defines a bore 27 adapted to receive a pivot pin 28. The pivot pin 28 extends through a circular bore in hinge point 30 which is in turn affixed to the slip 32. As will be clearly evident, six rocker arms 20 at spaced intervals are provided, although fewer could be contemplated.

Slip 32 defines on its front face a horizontal serrated edge 32a and on its rear face 32b an inwardly angled rear face. The rear face 32b is angled to correspond to a tapered beam jaw lock 34.

Within the body recess 2a, there is positioned an annular sealing element 36. The sealing element 36 is formed of a high temperature composite. Typically, the material would be able to sustain temperatures ranging between 300 - 500°F. Exemplary materials would comprise viton, high temperature silicon polymers, rubbers or the like.

The sealing element 36 is replaceably secured within the body recess 2a by means of a flange 38 and bolts 40.

Above the sealing element 36 there is positioned a compression ring 42. The ring 42 rest on the sealing element 36 being friction fitted within the body 2. An elongate compression rod 44 engages the compression ring 42 and is positioned within bore 2b being provided with a stop or seat therewithin.

As stated earlier, a pressure leakage control means is preferably provided for the controller 1. More specifically, a top 46 adapted to be bolted on using the existing bolts 7. An outer tube 40 is fitted around the controller 1. The lower flange 38 is extended so as to engage the outer tube 40.

In operation, actuation of the hydraulic cylinder 26 moves the rocker arm 20 downwardly, whilst simultaneously moving the compression rod 44 downwardly. The rocker arm 20 at its outer end moves the slips 32 into gripping engagement with the pipe 4. At the same time the compression rod 44 in association with the compression ring 42 compresses the sealing element 36 into sealing engagement with the pipe 4. The sealing element 36, under compression assumes a flattened circular, or donut-shaped, configuration. Conversely, retraction of the piston rod 24 lowers the outer end of rocker arm 20, raising the slips 32 out of gripping engagement with the pipe 4. Simultaneously the compression rod 44 moves upwardly releasing the compression ring 42 thereby causing the sealing element 36 to revert to the uncompressed configuration. It is to be noted that in order for the present device to be operative, it is preferable for there to be at least about eighteen inches of the pipe upstanding. A generally concentric annular opening, namely one within 10 - 15% of concentricity is preferred. Additionally, it would be preferred that no more than between 10 % to 15% bellling of the outside diameter.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE ARE CLAIMED ARE DEFINED AS FOLLOWS:

1. A blowout controller adapted for placement over an upstanding pipe to thereby curb wild well blowouts which comprises, in combination;

a cylindrical body defining an inner bore adapted to receive said pipe therein;

a resilient sealing element positioned on the inner circumference of said body, said sealing element being adapted to contract and expand against said pipe thereby coming into sealing engagement therewith;

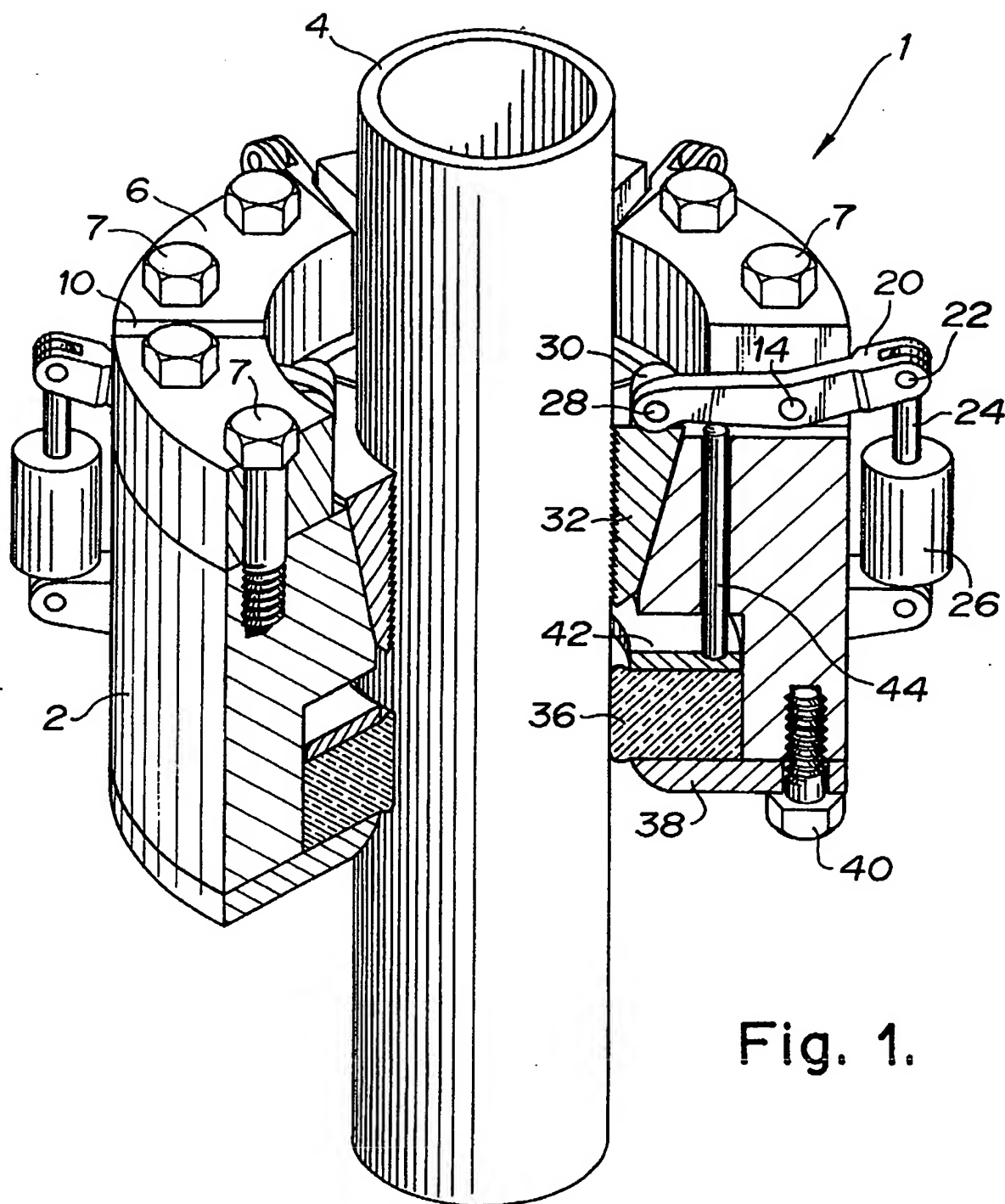
retaining means functional to secure said sealing member within said body;

clamping members functional to move into and out of gripping engagement with said pipe; and

means for simultaneously actuating said clamping members and said sealing element whereby said controller substantially clamps and seals said pipe.
2. The controller as set forth in claim 1 further comprising means associated with the upper section of said body for connecting a blowout preventor thereto.
3. The controller as set forth in claims 1 or 2 wherein said means for simultaneously actuating said clamping members and said sealing element comprises in combination, hydraulic rams functional to actuate a plurality of rocker arms, slips operatively connected to said rocker arms, and compression rods operatively connected to said rocker arms.
4. The controller as set forth in claim 1 further comprising means for controlling pressure leakage of well fluids.

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5. The controller as set forth in claim 3 further comprising means for controlling pressure leakage of well fluids.



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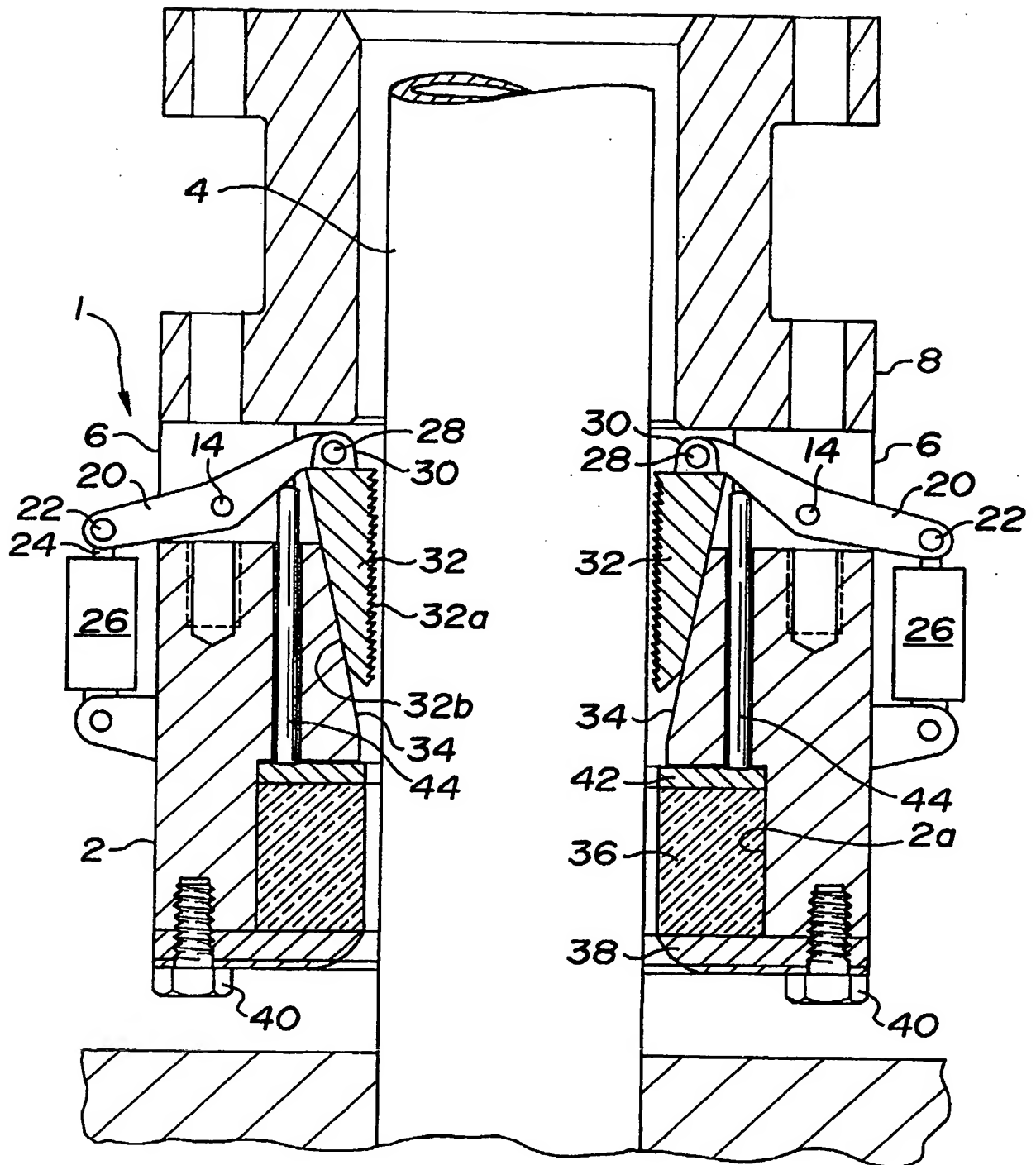


Fig. 2.

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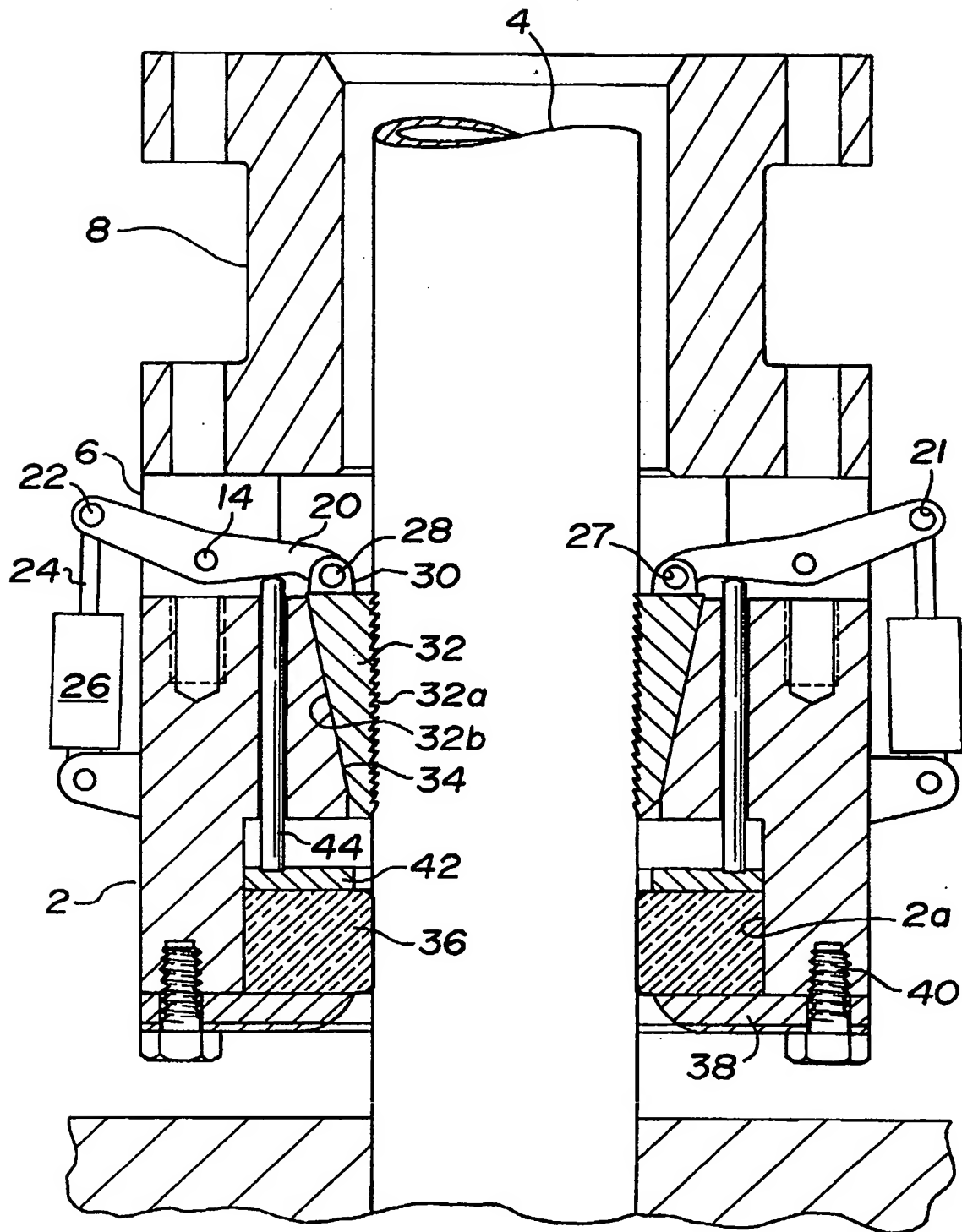


Fig. 3.

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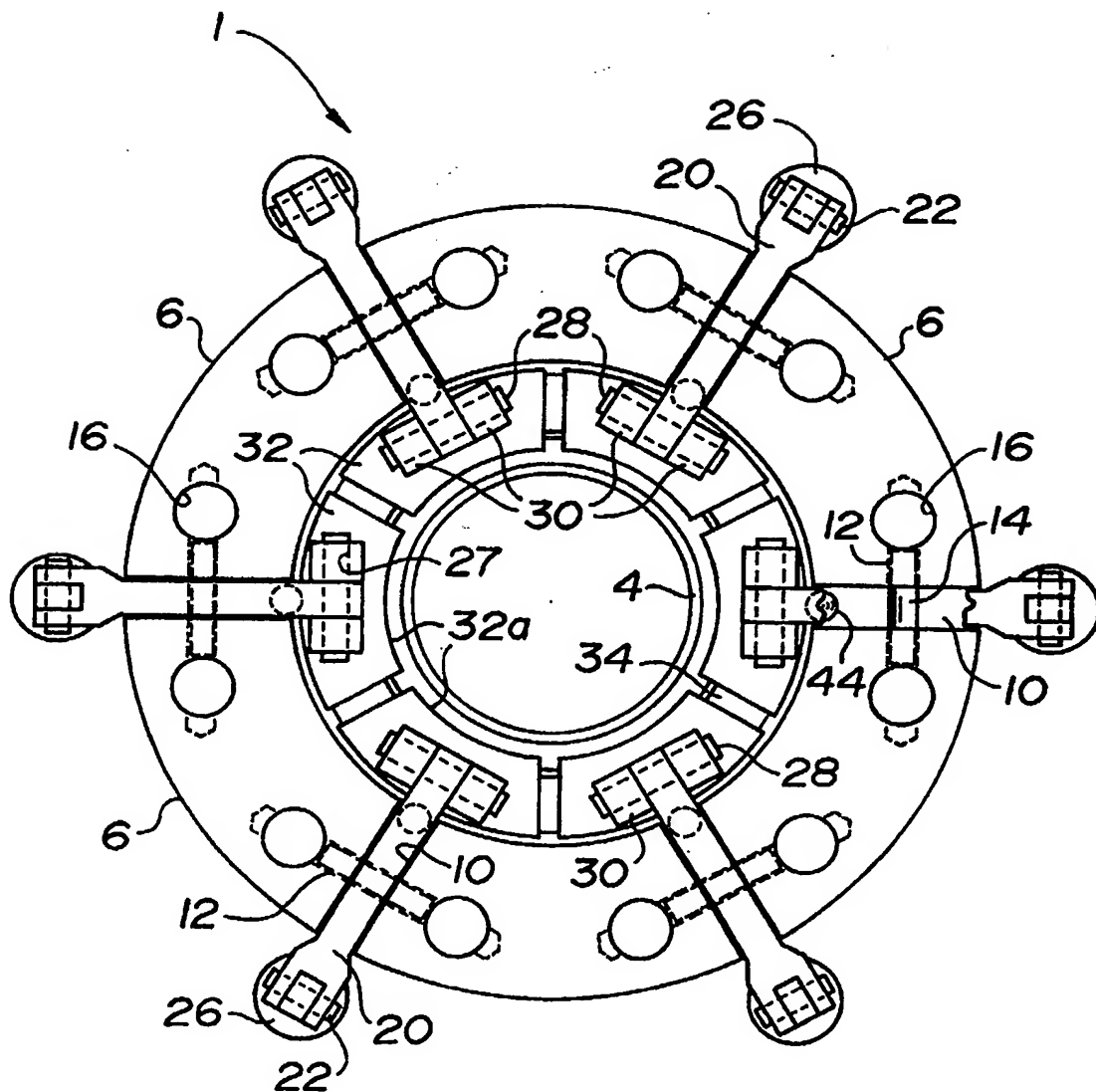


Fig. 4.

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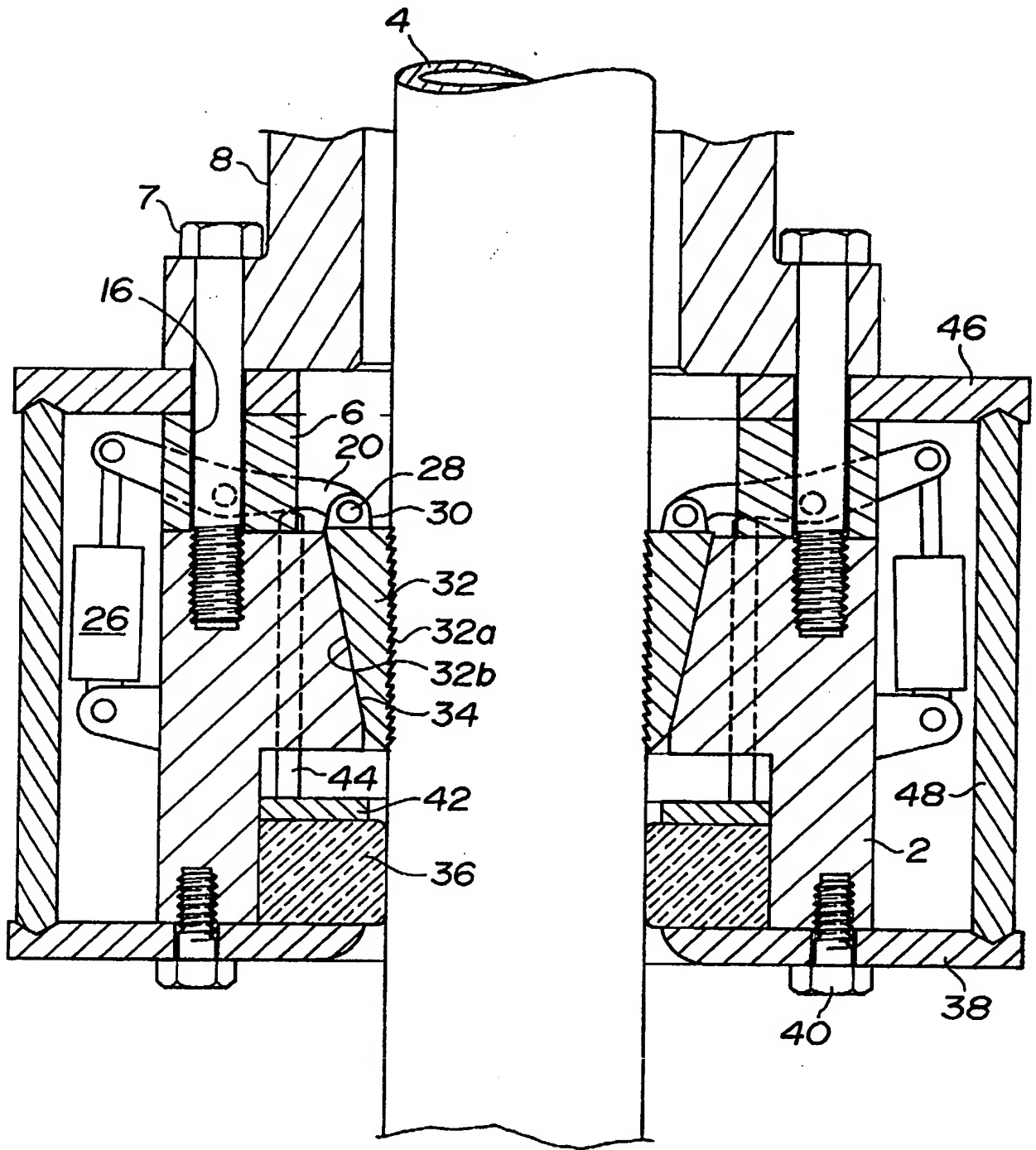


Fig. 5.



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